

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P3359.PC/PDW	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03026	International filing date (day/month/year) 11.07.2003	Priority date (day/month/year) 25.07.2002
International Patent Classification (IPC) or both national classification and IPC <b>B41J251</b>		
Applicant <b>WILLET INTERNATIONAL LIMITED ET AL.</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 3 sheets.</p> <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the opinion</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>		
Date of submission of the demand  24.02.2004	Date of completion of this report  26.08.2004	
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer   Van Oorschot, J Telephone No. +31 70 340-3044	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/03026

**I. Basis of the report**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-15 as originally filed

**Claims, Numbers**

1-4 received on 20.07.2004 with letter of 20.07.2004

**Drawings, Sheets**

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Yes: Claims	1-4
	No: Claims	
Inventive step (IS)	Yes: Claims	1-4
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-4
	No: Claims	

**2. Citations and explanations****see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/03026

**Re Section V**

Both GB2134045A and WO85/02012A show a print head comprising a rotatable print array with print valves. From figure 5 of GB2134045A (positions "0","1","2","3","4","5") and from page 17 line 11 to page 18 line 10 of WO85/02012A (3/4-height, 1/2-height), it can be concluded that these documents propose a limited and fixed number of possible rotational orientations for printing. These documents appear to imply the features of the preamble of claim 1.

The problem of allowing maximum rotational adjustment possibilities is solved by reading the print data subelements from the memory locations for each subsequent time period for each drive pulse.

No available document shows this solution to solve this problem. US4567570A shows a comparable solution but for a head with a constant slant angle.

Therefore claim 1, and likewise independent claim 3 and dependent claims 2 and 4, are considered to meet the requirements of Art 33 PCT.

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## CLAIMS

1. A print head comprising: a rotatable print array comprising a plurality of print valves, a valve control means in communication with the print array a pulse generating means, in use generating a regular sequence of pulse signals and means for rotating, in use, the print array to a predetermined rotation;

10 the valve control means comprising:

one or more data input lines to receive print data; memory means comprising an array of memory locations to store the received print data, one dimension of the array of memory locations being associated with the 15 plurality of print valves of the rotatable print array and the other dimension of the array of memory locations being associated with a plurality of pre-determined time periods; and

processing means to process the stored print data, 20 wherein the processing means, in use,

(a) processes the print data in accordance with the predetermined rotation of the rotatable print array;

25 (b) divides the print data into a plurality of sub-elements, each print data sub-element being associated with a respective print valve and a respective pre-determined time period;

(c) writes each print data sub-element to the memory location associated with the respective print valve and the respective pre-determined time period;

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(d) sequentially reads one or more print data sub-elements from the memory locations associated with one pre-determined time period;

5 (e) activates the respective print valves associated with the one or more print data sub-elements read in step (d);

characterised in that step (d) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means.

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2. A print head according to claim 1, wherein the processing means, in use;

(f) overwrites the memory locations read during step (d) after the activation of the print valves in step (e).

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3. A method of printing an image with a print head comprising a rotatable print array comprising a plurality of print valves, the method comprising the steps of:

20 (a) rotating the print head to a predetermined rotation;

(b) generating a regular sequence of pulse signals;

(c) generating a raster signal representing the image to be printed;

25 (d) dividing the raster signal into a plurality of sub-elements;

(e) writing each raster signal sub-element into memory means comprising an array of memory locations to store the received print data, one dimension of the array of memory locations being associated with the plurality of print valves of the rotatable print array and the other dimension of the array of memory locations being

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associated with a plurality of pre-determined time periods;

5 (f) sequentially reading each raster signal sub-element from the memory locations associated with one pre-determined time period; and

(g) activating the respective print valves associated with each raster signal sub-element read in step (f);

10 characterised in that step (f) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means.

4. A method according to any of claims 8 to 12, wherein the method comprises the further step of

15 (g) over-writing the memory locations following the reading of the raster signal sub-elements.

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AMENDED SHEET